

Use of the NEI 1999 Inventory for Regional and Continental Scale Chemical Transport Modeling of Regional Haze.

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Emissions Inventories

Applying New Technologies

April 29th – May 1st 2003

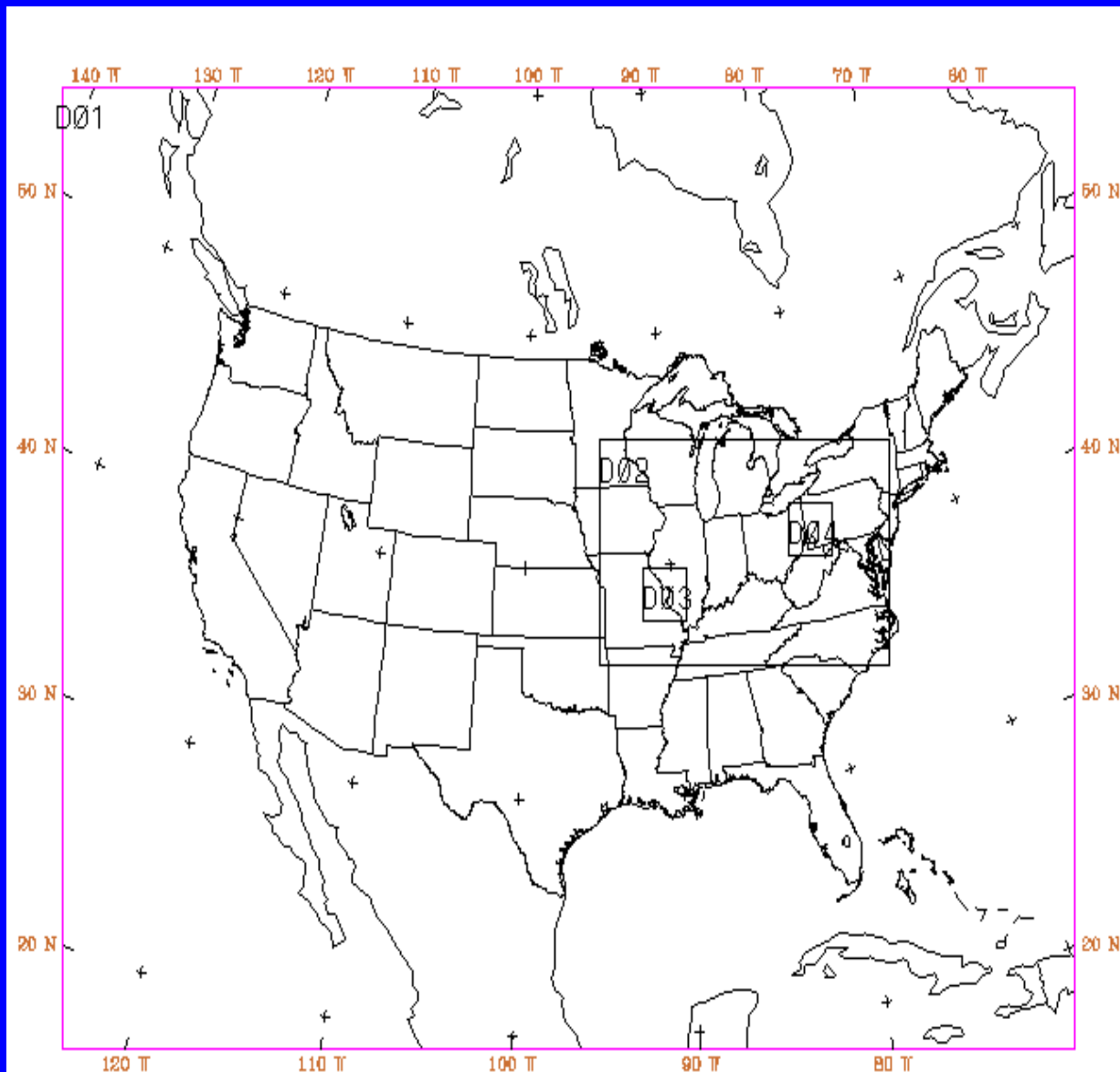
San Diego, Ca



Base D Inventory

- Fourth Haze Inventory LADCO built.
- Primarily Based on NEI 1999 Version 2
- Grid Covers Continental US and Southern Canada.
- No Mexican Inventory
- Processed with EMS-2003

Midwest RPO Grids



Value of Doing Early Modeling Yourself

- Paradigm is different from Some RPO's
 - Hire Contractors vs Do it yourself
- Helps groups to recognize resource needs
- Brings spatial, temporal, and speciation issues to the forefront.

Using NIF Files for Emissions Modeling

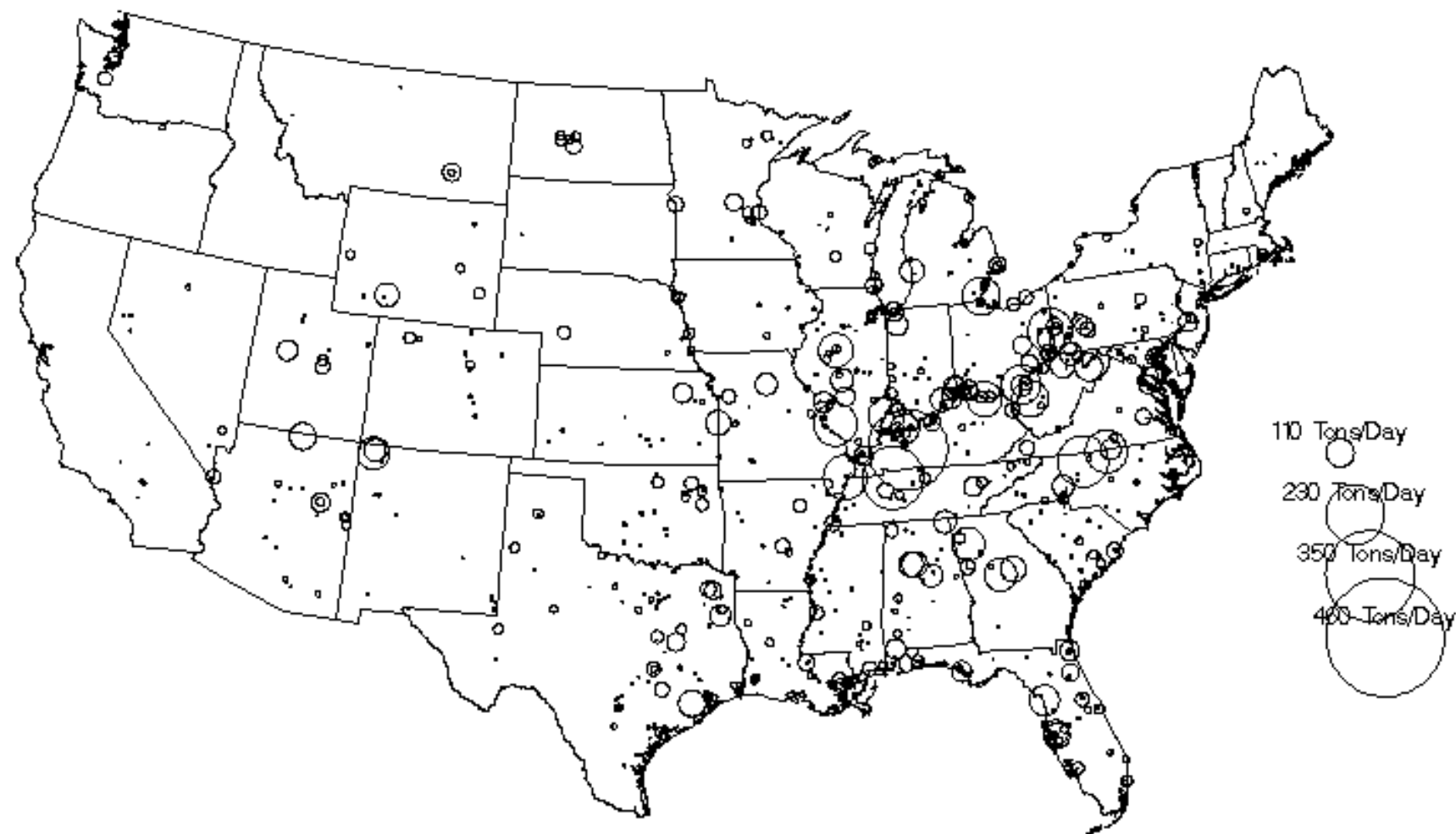
- After problems with past version of NEI EPA released version 1999 NEI version 2 in real NIF format ascii. (Not MS Access)
- Evaluation of NIF versus EMS-95 and IDA lead to the conclusion that File converters would not work.
 - NIF has much more complex temporal options
 - NIF has more complex stack configurations
- Re-Wrote point and area source models in EMS.

Point Sources

- EPA's NEI 1999 with Modification
 - Several erroneous source identified in IL, MI, FL. Very large sources removed from Colorado
 - All Utah records with emissions type 27(Average Weekday).
 - PM10-FIL and PM25-FIL pollutants deleted because they are subset of primary emissions. PM25-CON also removed.
- Canadian inventory based on EPA's IDA files.

Circle Plot of NOX Sources

CASE: baseC



CEM and Electric Utilities

- Converted 1999 and 2000 CEM data from ARD to NIF 2.0 “EM” record types.
- NIF not efficient for hour specific records.
- Facility ID matching hardest part
- Blank values problematic
- No hour specific stack parameters.

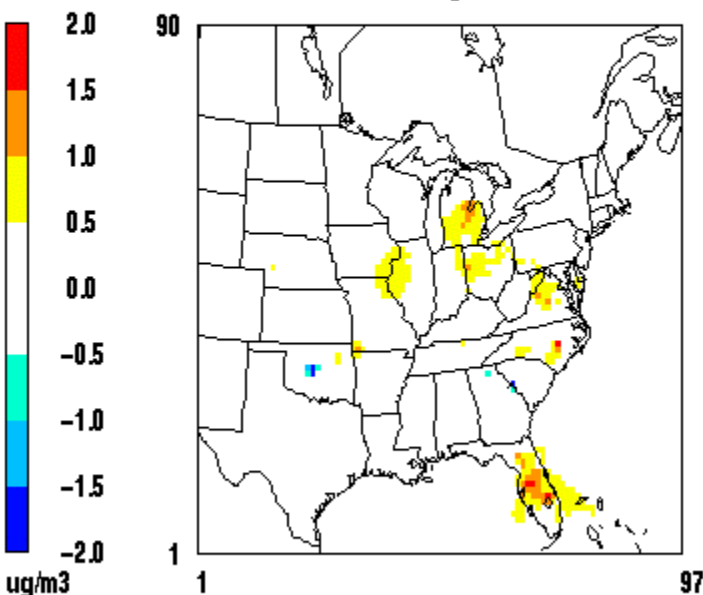
CEM Temporal Profiles

- Contractor created new temporal profiles based on CEM data by boiler.
 - Season of year
 - Day of Week by season
 - Hour of day by day of week and season
- Working on temperature corrective factors
- LADCO States IL, IN, MI, OH, WI
 - Neighbors MN, IA, MO, KY, TN, WV, PA

Winter High PM2.5 Day

rawcem2 – baseC

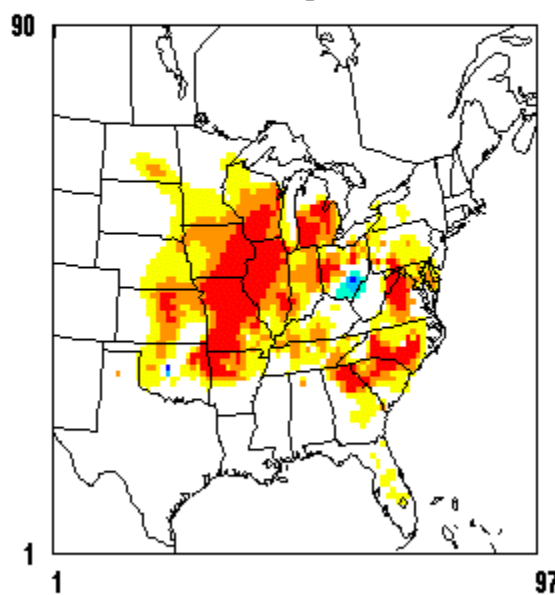
Daily Average PM25 Difference
36km grid



January 18, 2000 0:00:00
Min= -5.3 at (24,32), Max= 1.8 at (67,12)

cemprof – baseC

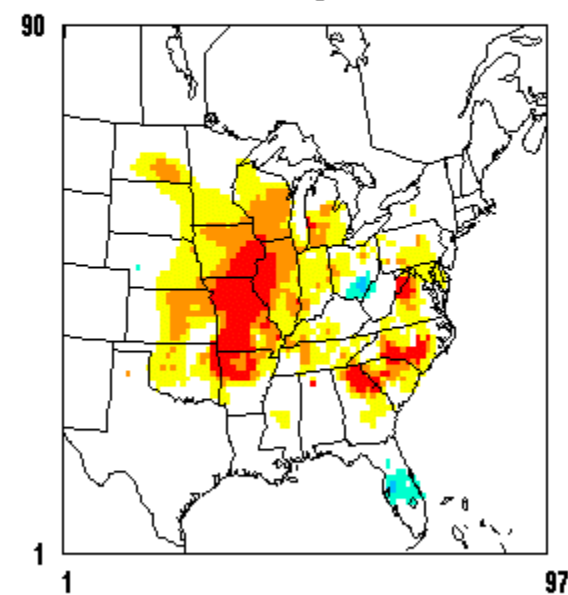
Daily Average PM25 Difference
36km grid



January 18, 2000 0:00:00
Min= -4.3 at (24,32), Max= 4.7 at (32,36)

cemprof – rawcem2

Daily Average PM25 Difference
36km grid

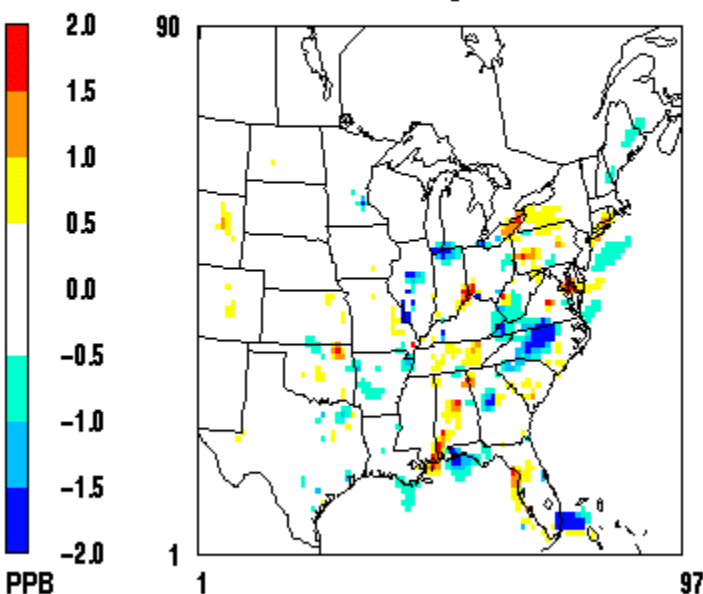


January 18, 2000 0:00:00
Min= -1.3 at (61,45), Max= 4.4 at (64,29)

Summer High O3 Day

rawcem2 – baseC

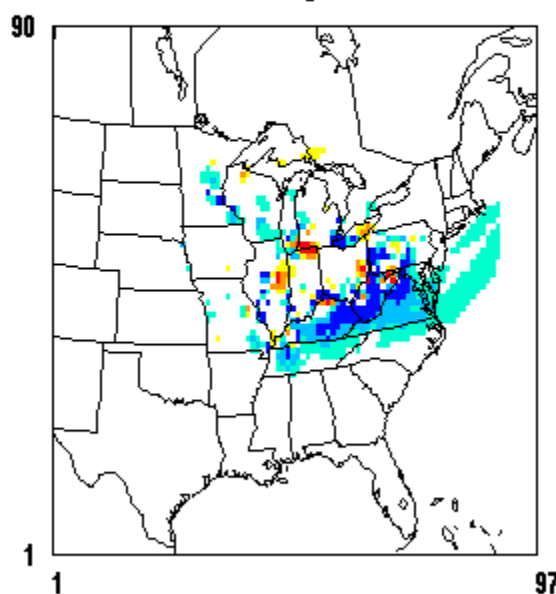
Daily Maximum Ozone Difference
36km grid



August 28, 1999 0:00:00
Min= -6.6 at (74,5), Max= 3.4 at (55,45)

cemprof – baseC

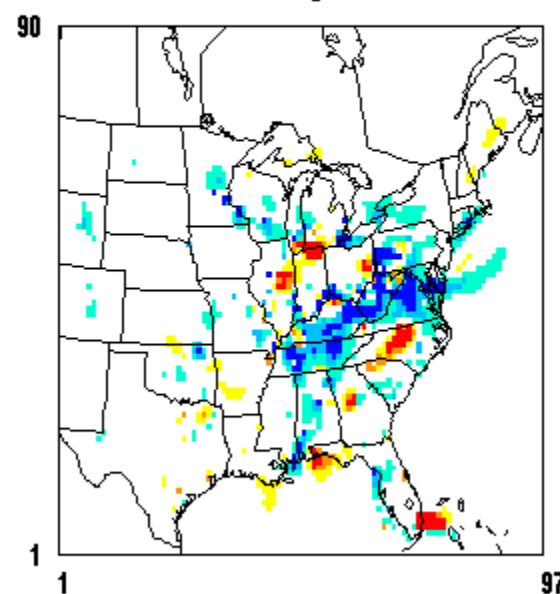
Daily Maximum Ozone Difference
36km grid



August 28, 1999 0:00:00
Min= -10.4 at (61,45), Max= 2.9 at (50,53)

cemprof – rawcem2

Daily Maximum Ozone Difference
36km grid

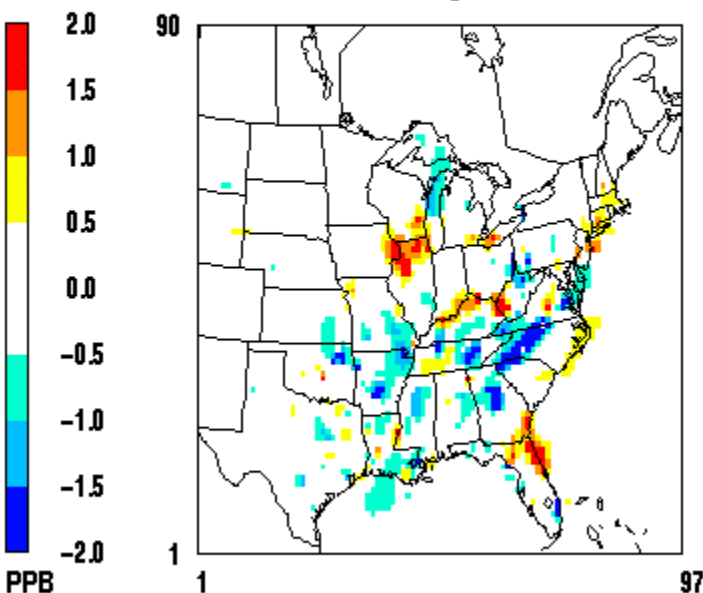


August 28, 1999 0:00:00
Min= -9.0 at (61,45), Max= 6.6 at (74,5)

Summer Low O3 Day

rawcem2 – baseC

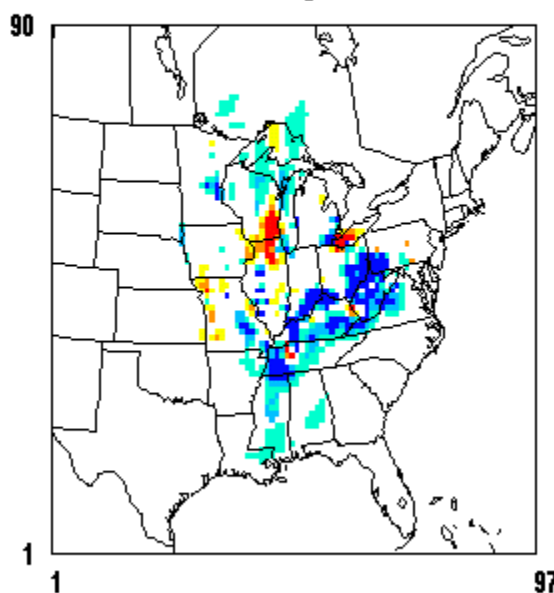
Daily Maximum Ozone Difference
36km grid



August 15, 1999 0:00:00
Min= -6.3 at (61,27), Max= 3.8 at (70,15)

cemprof – baseC

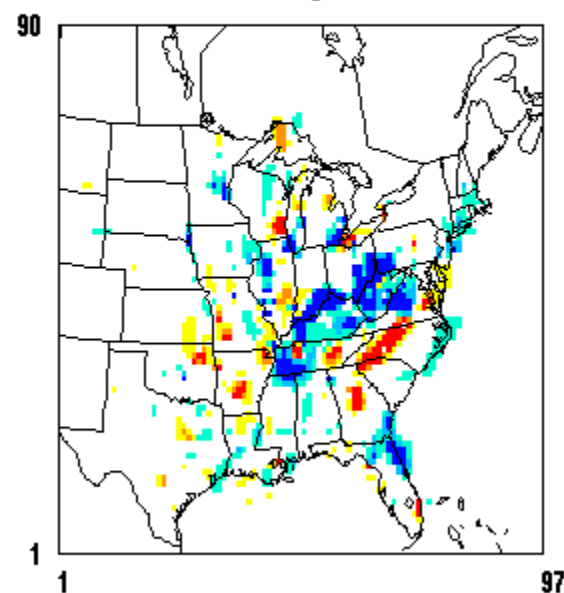
Daily Maximum Ozone Difference
36km grid



August 15, 1999 0:00:00
Min= -13.6 at (64,50), Max= 4.2 at (45,56)

cemprof – rawcem2

Daily Maximum Ozone Difference
36km grid



August 15, 1999 0:00:00
Min= -10.4 at (64,50), Max= 6.1 at (61,27)

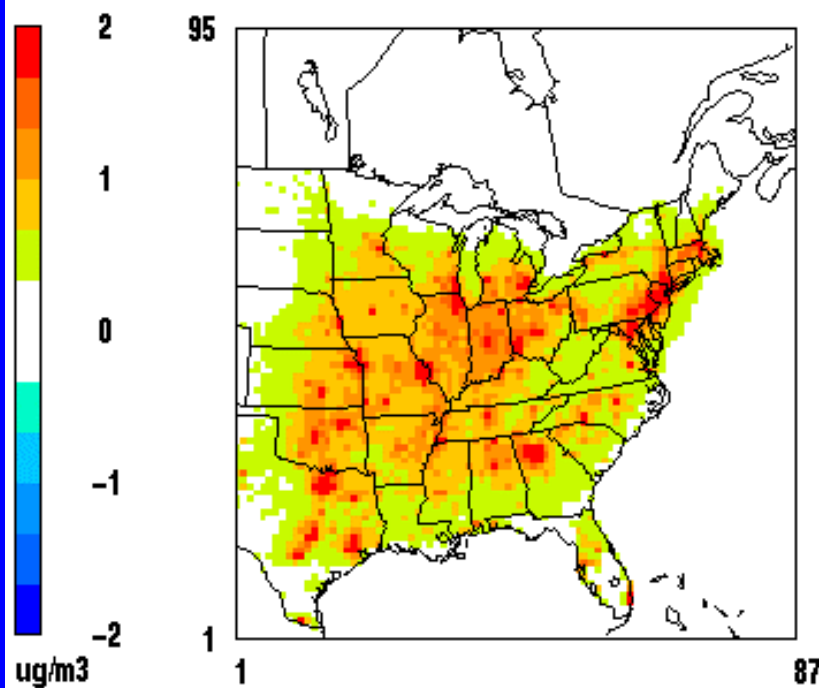
Other Area Sources

- Based on NEI version 2.0
 - Removed all NH₃ sources (We'll use CMU)
 - Included Canadian inventory in NIF format
 - Removal of PM₂₅-FIL and PM₁₀-FIL
 - Application of a 90% reduction factor to all dust categories of dust for transportable fraction. EPA's value is 75%

Dust Sensitivity

CRUSTAL Episode AVG

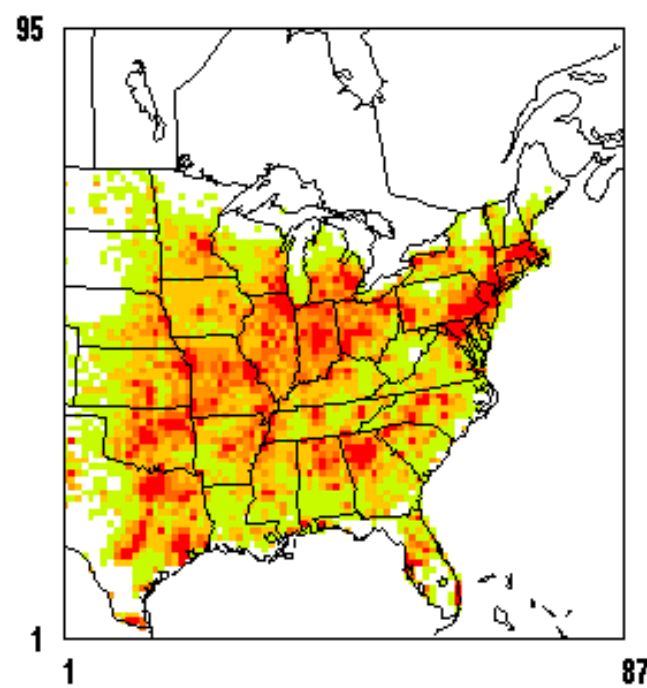
baseA - dust
eus 36 km - 1999



August 3, 1999 0:00:00
Min= 0 at (87,1), Max= 7 at (15,24)

PMC Episode AVG

baseA - dust
eus 36 km - 1999



August 3, 1999 0:00:00
Min= -0 at (83,7), Max= 13 at (19,14)

Off-Road Mobile Sources

- EPA's NEI 1999 version 2 inventory
- Problematic because no equipment populations or emission factors included in files.

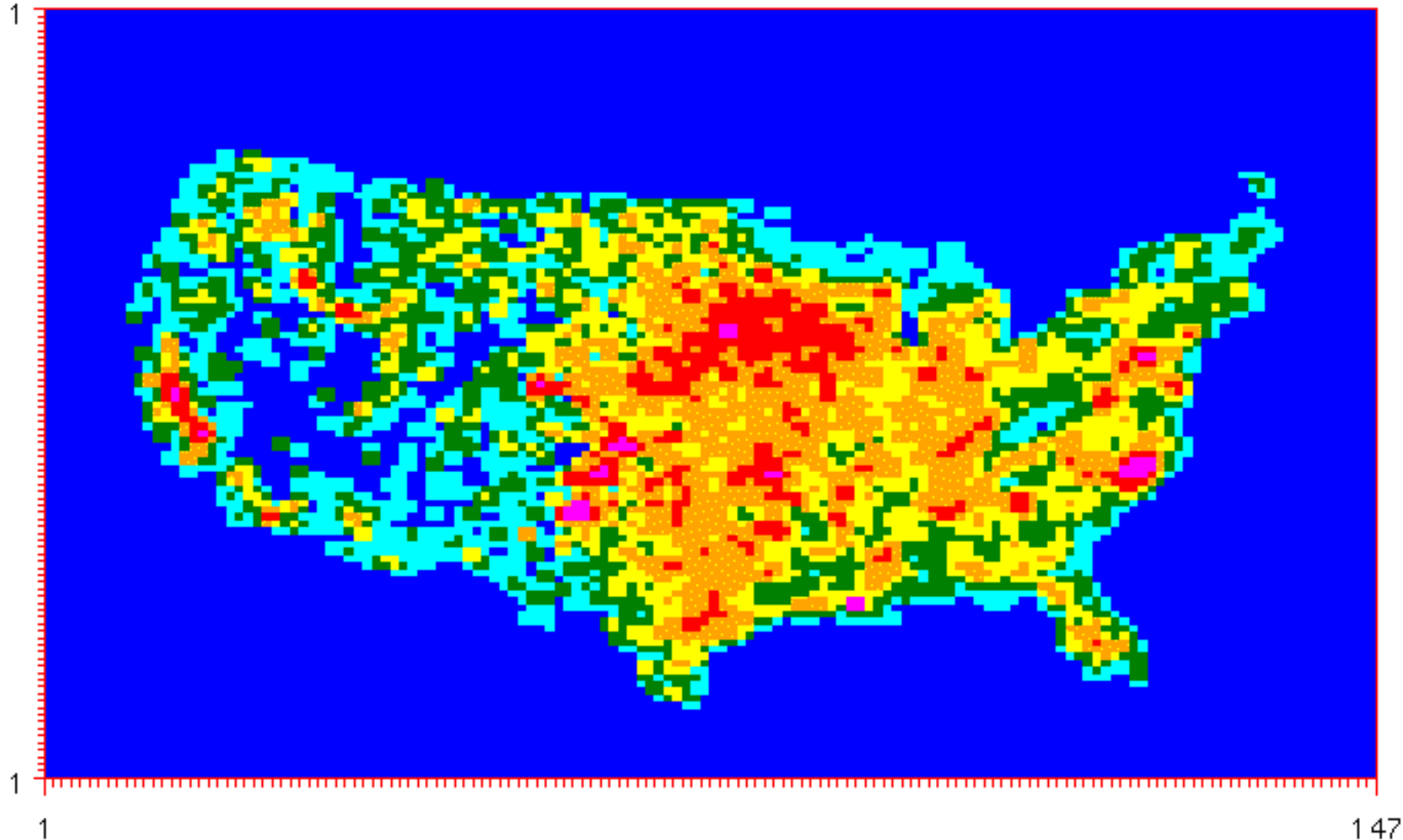
CMU Ammonia Model

- Contractor report updated emission factors.
- New version of CMU model with improved User interface and NIF output format with completely transparent reporting.
- Did not include natural soils.
- No Nonroad NH₃ emissions.

SECTOR TONS FOR , 07/15/01

POLID = NH3 TYPE = Other Total: 12116.40767

jcell
111



ice11

CELLTOT



0.0000
3.1401



0.0905
7.1140



0.9095
17.2789



1.7836

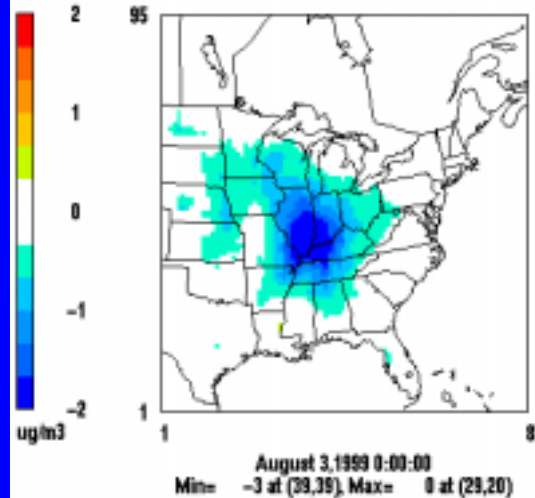
WHERE: CELLTOT = ACEE/907.185

Plot Generated on 06/11/02

CMU Sensitivity (aug 99)

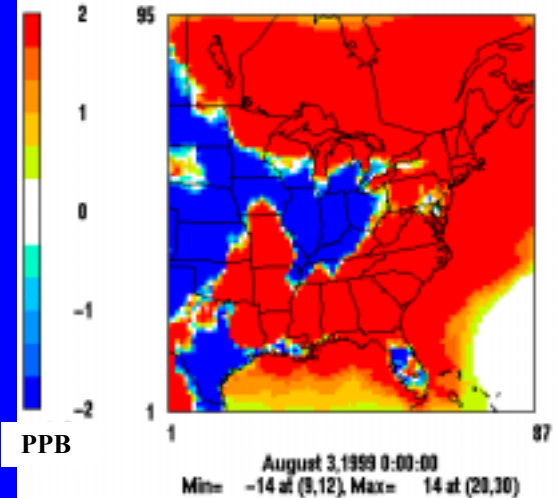
PSO4 Episode AVG

baseA - cmu
eus 36 km - 1999



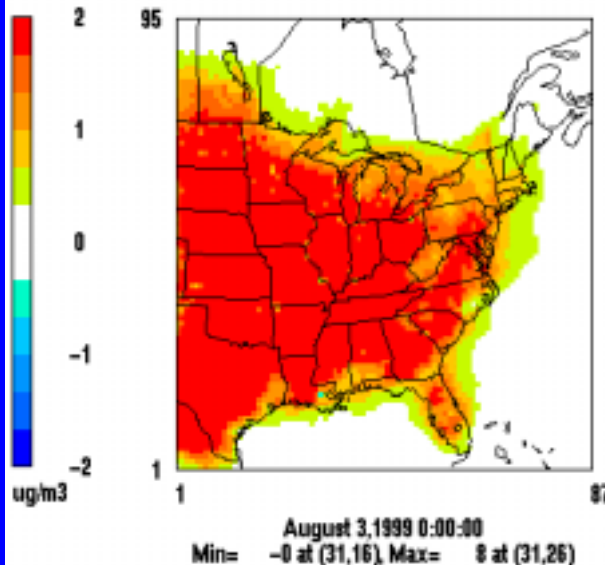
O3 Episode AVG

baseA - cmu
eus 36 km - 1999



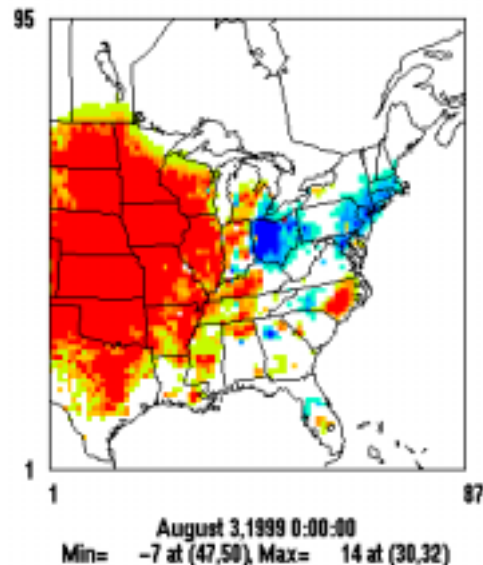
HNO3

baseA - cmu
eus 36 km - 1999



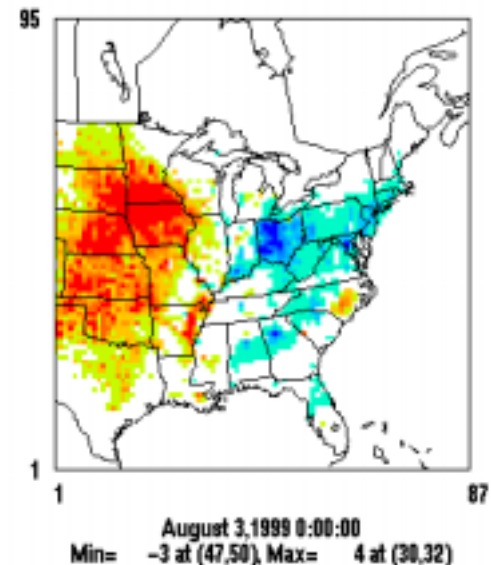
PNO3 Episode AVG

baseA - cmu
eus 36 km - 1999



PNH4 Episode AVG

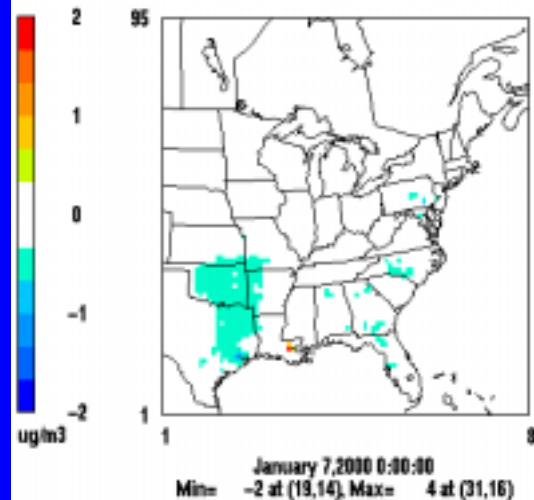
baseA - cmu
eus 36 km - 1999



CMU Sensitivity (jan 00)

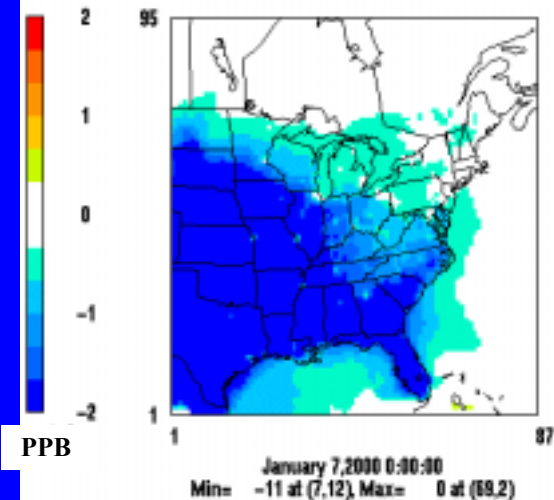
PSO4 Episode AVG

baseA - cmu
eus 36 km - 2000



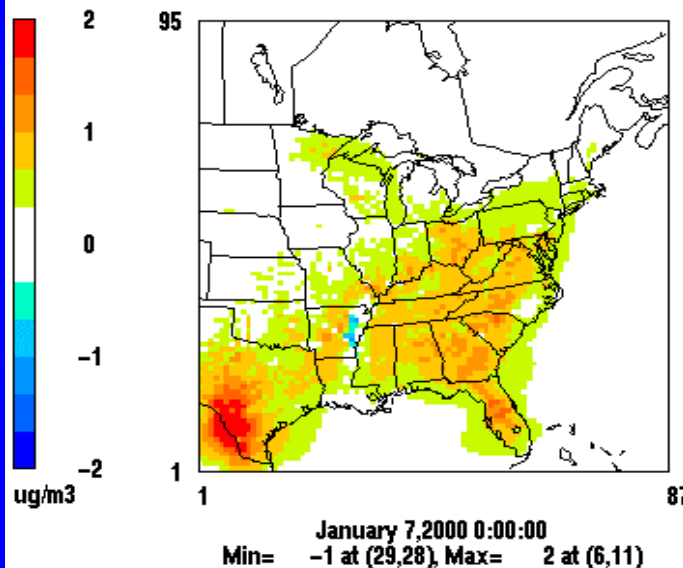
O3 Episode AVG

baseA - cmu
eus 36 km - 2000



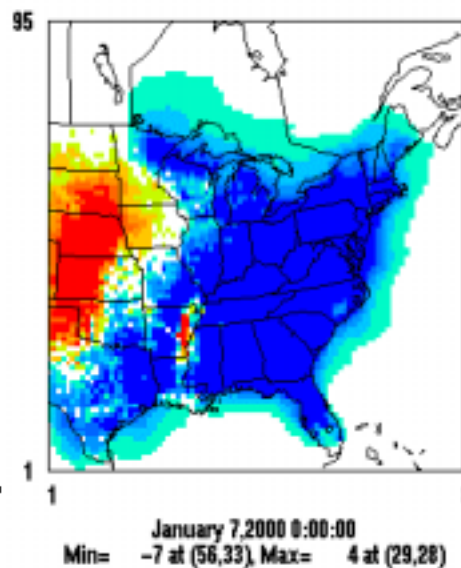
HNO3 Episode AVG

baseA - cmu
eus 36 km - 2000



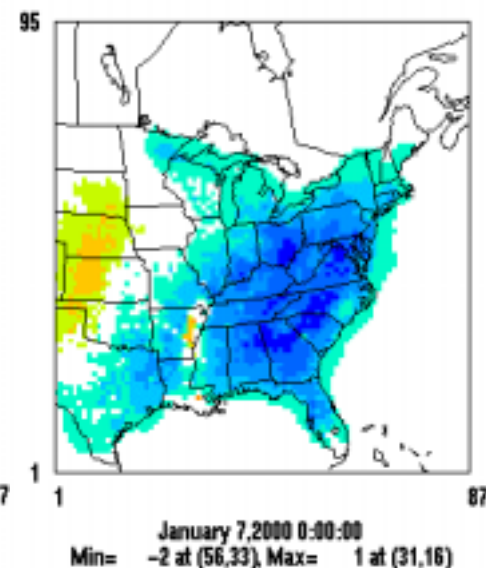
PNO3 Episode AVG

baseA - cmu
eus 36 km - 2000



PNH4 Episode AVG

baseA - cmu
eus 36 km - 2000



Conclusion

- NEI 1999 version 2 is a very good starting point for regional Haze Modeling
 - Some modifications will be necessary
 - Local improvements necessary before SIP level modeling can proceed. This mostly includes local temporal factors for key categories.

Future Directions

- Build a New emissions model to replace SMOKE and EMS-2003
 - SQL Based (Transparent, Open)
 - Emphasis on QA tools
 - Ozone/PM/Toxics
- Improve Temporal Profiles for Many Categories

Future Directions

- Significant Nonroad Work
 - Ag Equipment, Construction, Vessels, Locomotives, Motorboats
- Build Fire Inventory
- Collect Urban Travel Demand Networks
- Methods Consistency Review with states
- Continue Review of CEM Data
- Update NH₃ Populations to 2003
- Etc.